

Amendments to the claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-87. (Canceled)

88. (Currently amended) An integrated circuit structure comprising:

a first substrate; and

a second substrate bonded to the first substrate ~~to form; and~~

conductive paths formed between the first substrate and the second substrate, wherein the second substrate is a thinned substrate having circuitry formed thereon.

89. (Withdrawn) The apparatus of claim 88, wherein the second substrate is one of a thinned monocrystalline semiconductor substrate and a thinned polycrystalline semiconductor substrate.

90. (Withdrawn) The apparatus of claim 88, wherein the circuitry formed on the second substrate is one of active circuitry and passive circuitry.

91. (Withdrawn) The apparatus of claim 88,
wherein the circuitry formed on the second substrate consists
of both active circuitry and passive circuitry.

92. (Withdrawn) The apparatus of claim 88,
wherein the first substrate is a substrate having circuitry
formed thereon.

93. (Withdrawn) The apparatus of claim 92,
wherein the circuitry of the first substrate is one of active
circuitry and passive circuitry.

94. (Withdrawn) The apparatus of claim 92,
wherein the circuitry of the first substrate comprises both
active circuitry and passive circuitry.

95. (Currently amended) The apparatus structure of
claim 88, further comprising:

at least one additional thinned substrate having
circuitry formed thereon ~~bonded to one of the second
substrate or an adjacent additional thinned substrate to
form;~~

a first of said at least one additional thinned
substrate being bonded to the second substrate and any
additional thinned substrates being bonded to the directly
adjacent additional thinned substrate; and

conductive paths formed between the said first of
said at least one additional thinned substrate and one of the
said second substrate and also between each additional
thinned substrate and [[or]] the directly adjacent additional
thinned substrate.

96. (Withdrawn) The apparatus of claim 95,
wherein at least two of the first, the second and the at
least one additional thinned substrates are formed using a
different process technology, wherein the different process
technology is selected from the group consisting of DRAM,
SRAM, FLASH, EPROM, EEPROM, Ferroelectric and Giant Magneto
Resistance.

97. (Withdrawn) The apparatus of claim 95,
wherein at least one of the first, the second and the at
least one additional thinned substrates comprises a
microprocessor.

98. (Withdrawn) The apparatus of claim 95,
wherein:

at least one substrate of the first, the second and
the at least one additional thinned substrates has memory
circuitry formed thereon; and

at least one substrate of the first, the second and
the at least one additional thinned substrates has logic

circuitry formed thereon that performs tests on the at least one substrate that has memory circuitry formed thereon.

99. (Withdrawn) The apparatus of claim 95, wherein at least one substrate of the first, the second and the at least one additional thinned substrates has memory circuitry formed thereon, the memory circuitry having a plurality of memory locations, wherein at least one memory location of the plurality of memory locations is used for sparing and wherein data from the at least one memory location on the at least one substrate having memory circuitry formed thereon is used instead of data from a defective memory location on the at least one substrate that has memory circuitry formed thereon.

100. (Withdrawn) The apparatus of claim 95, wherein:

at least one substrate of the first, the second and the at least one additional thinned substrates has memory circuitry formed thereon; and

at least one substrate of the first, the second and the at least one additional thinned substrates has logic circuitry formed thereon that performs programmable gate line address assignment with respect to the at least one substrate having memory circuitry formed thereon.

101. (Withdrawn) The apparatus of claim 95,
further comprising a plurality of interior vertical
interconnections that traverse at least one of the first, the
second and the at least one additional thinned substrates.

102. (Withdrawn) The apparatus of claim 95,
wherein information processing is performed on data routed
between the circuitry of at least two of the first, the
second and the at least one additional thinned substrates.

103. (Withdrawn) The apparatus of claim 95,
wherein at least one of the first, the second and the at
least one additional thinned substrates has reconfiguration
circuitry.

104. (Withdrawn) The apparatus of claim 95,
wherein at least one of the first, the second, and the at
least one additional thinned substrates has logic circuitry
formed thereon for performing at least one function from the
group consisting of: virtual memory management, ECC, indirect
addressing, content addressing, data compression, data
decompression, graphics acceleration, audio encoding, audio
decoding, video encoding, video decoding, voice recognition,
handwriting recognition, power management and database
processing.

105. (Withdrawn) The apparatus of claim 95,
further comprising:

a memory array having a plurality of memory storage cells, a plurality of data lines, and a plurality of gate lines, each memory storage cell stores a data value and has circuitry for coupling the data value to one of the plurality of data lines in response to receiving a gate control signal from one of the plurality of gate lines;

circuitry that generates the gate control signal in response to receiving an address, including means for mapping addresses to gate lines; and

a controller that determines if one of the plurality of memory cells is defective and alters said mapping to remove references to the one of the plurality of memory cells that is defective.

106. (Currently amended) The apparatus structure of claim 95, further comprising:

at least one controller substrate having logic circuitry formed thereon;

at least one memory substrate having memory circuitry formed thereon;

a plurality of data lines and a plurality of gate lines on each memory substrate;

an array of memory cells on each memory substrate,

each memory cell stores a data value and has circuitry that couples the data value to one of the plurality of data lines in response to selecting one of the plurality of gate lines;

a gate line selection circuit that enables a gate line for a memory operation, wherein the gate line selection circuit has programmable gates to receive address assignments for at least one gate line of the plurality of gate lines and wherein the address assignments for determining which of the plurality of gate lines is selected for each programmed address assignment; and

controller substrate logic that determines if one memory cell of the array of memory cells is defective and alters the address assignments of the plurality of gate lines to remove references to the gate line that causes the defective memory cell to couple a data value to one of the plurality of data lines.

107. (Currently amended) The apparatus structure of claim 106, wherein the controller substrate logic:

tests the array of memory cells periodically to determine if one of the array of memory cells is defective; and

removes references in the address assignments to gate lines that cause detected defective memory cells to couple data values to the plurality of data lines.

108. (Currently amended) The apparatus structure of claim 106, further comprising:

programmable logic to prevent the use of data values from the plurality of data lines when gate lines cause detected defective memory cells to couple data values to the plurality of data lines.

109. (Currently amended) The apparatus structure of claim 106, wherein the array of memory cells are arranged within physical space in a physical order and are arranged within an address space in a logical order and wherein the physical order of at least one memory cell is different than the logical order of the at least one memory cell.

110. (Currently amended) The apparatus structure of claim 106, wherein:

the logic circuitry of the at least one controller substrate is tested by an external means; and

the array of memory cells of the at least one memory substrate are tested by the logic circuitry of the at least one controller substrate, wherein the testing achieves a functional testing of a substantial portion of the array of memory cells.

111. (Currently amended) The apparatus structure of claim 106, wherein the logic circuitry of the at least one

controller substrate performs functional testing of a substantial portion of the array of memory cells.

112. (Currently amended) The apparatus structure of claim 106, wherein the controller substrate logic is further configured to:

prevent the use of at least one defective gate line; and

replace references to memory cells addressed using the defective gate line with references to spare memory cells addressed using a spare gate line.

113. (Currently amended) The apparatus structure of claim 106, wherein the controller substrate logic is further configured to prevent the use of at least one defective gate line.

114. (Currently amended) The apparatus structure of claim 106, wherein the logic circuitry of the at least one controller substrate performs all functional testing of the array of memory cells of the at least one memory substrate.

115. (Withdrawn) The apparatus of claim 88, wherein the first substrate is a non-semiconductor material.